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METALLIC CERAMICS:

A NEW "OLD GENERATION" OF CATALYSTS WITH TUNABLE SELECTIVITY

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One of the key conditions for a successful catalytic process is the catalyst itself. This apparently naïve assertion in fact holds a great implication, such as the possibility to have a fine control on crucial chemical processes simply by "building up" an ideal catalyst according to the specific needs. Thus, in heterogeneous catalysis, the age of plain catalysts has been superseded by more sophisticated materials, including hierarchical systems, hybrids and nanocomposites.

In the search for refined catalysts, an important role is played by nanocomposites made of interstitial metals (M), metal carbides (MC) and metal nitrides (MN) loaded onto functional hosting matrix, including structured carbon based matrixes.
MN/MC in particular are potential replacement to more expensive and rare catalysts, thanks to their peculiar electronic structure but, more interesting, thanks to an easily tunable selectivity.

In the last years, M/MN/MC based systems have been designed in our group for selected catalytic processes (e.g. biomass decomposition). Here the MN/MC were used in a double role: either as catalysts or as active support.

Alongside very promising performances, the selectivity of these catalysts can be tuned simply by changing the reaction conditions, thus contributing to the development of a new generation of multifunctional catalysts.